

What is claimed is:

1. A plasma density information measuring method, comprising the steps of:
supplying high-frequency power to plasma;
measuring a physical amount indicative of reflection or absorption state of said
5 high-frequency power by plasma load; and
obtaining a frequency at which strong high-frequency power absorption is
caused due to plasma density, i.e., a plasma absorption frequency based on the
measurement result of said physical amount.

2. A plasma density information measuring method according to claim 1, wherein
said high-frequency power is supplied to plasma through a division wall.

3. A plasma density information measuring method according to claim 1, wherein
said physical amount indicative of reflection or absorption state of said high-frequency
power by plasma load is measured by measuring an electric current amount of a high-
frequency amplifier for supplying high-frequency power.

4. A plasma density information measuring method according to claim 1, wherein
said reflection amount of high-frequency power is detected while sweeping high-
frequency power frequency, and said plasma absorption frequency is obtained based on
relationship between sweep-frequency and a detected result of said reflection amount of
high-frequency power.

5. A plasma density information measuring method according to claim 1, wherein
a plasma surface wave resonance frequency is obtained as said plasma absorption
frequency.

6. A plasma density information measuring method according to claim 5, wherein
electron density in plasma to be measured is calculated in accordance with said obtained
25 plasma surface wave resonance frequency.

7. A plasma density information measuring method according to claim 1, wherein Tonks-Dattner resonance frequency is obtained as said plasma absorption frequency.

8. A probe used for measuring plasma density information, comprising:
a dielectric tube whose tip end is closed;

5 an antenna accommodated in said tube at its tip end side for radiating high-frequency power; and

a cable accommodated in said tube at its rear side and connected to said antenna for transmitting said high-frequency power.

9. A probe used for measuring plasma density information according to claim 8, wherein said antenna and said cable accommodated in said dielectric tube are capable of moving along a longitudinal direction of said tube such that a position of said antenna in said tube can be varied.

10. A probe used for measuring plasma density information according to claim 8, wherein a conductor for preventing a leakage of ejected electromagnetic wave from said antenna is disposed at a position slightly back from said antenna such as to occlude a gap between said cable and an inner surface of said tube.

11. A probe used for measuring plasma density information according to claim 8, further comprising probe cooling means for forcibly cooling said probe.

12. A probe used for measuring plasma density information according to claim 8, wherein said cable for transmitting high-frequency power comprises a conductor tube for a core wire and a shield, and an insulative ceramics material for filling a gap between said core wire and said conductor tube.

13. A probe used for measuring plasma density information according to claim 8, wherein a surface of said dielectric tube is coated with metal such that a measuring area of said dielectric tube is not coated.

14. A probe used for measuring plasma density information according to claim 8, wherein said antenna is extended closely along an inner surface of said dielectric tube.

15. A plasma density information measuring apparatus, comprising:

sweep-frequency type high-frequency power supplying means for supplying

high-frequency power to plasma while sweeping frequency;

reflection power amount detecting means for detecting a reflection amount of said high-frequency power; and

power reflection coefficient frequency characteristics obtaining means for obtaining a counter frequency variation of reflection coefficient of high-frequency power based on a sweep-frequency of said high-frequency power and the detected result of said reflection amount of high-frequency power.

16. A plasma density information measuring apparatus according to claim 15, further comprising a dielectric division wall interposed between plasma and said sweep-frequency type high-frequency power supplying means.

17. A plasma density information measuring apparatus according to claim 16, further comprising a dielectric tube whose tip end is closed, an antenna accommodated in said tube at its tip end side for radiating high-frequency power, and a cable accommodated in said tube at its rear side and connected to said antenna for transmitting said high-frequency power, wherein

high-frequency power is supplied from said antenna in said tube to plasma using a tube wall of said dielectric tube as a division wall,

a plurality of antennas are accommodated in said dielectric tube such that distances between a tip end of said tube and said antennas are different from one another, and

said power reflection coefficient frequency characteristics obtaining means